

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-43

**Name:** Wall Lake

**County:** Minnehaha

**Legal Description:** T101N-R51W-Sec. 21 & 28

**Location from nearest town:** 6 miles south and 1/2 mile west of Hartford, SD

**Dates of present survey:** June 21-23, 2010

**Date last surveyed:** June 23-25, 2008

Managed Species	Other Species
Walleye	Black Bullhead
Black Crappie	Northern Pike
Yellow Perch	White Sucker
Channel Catfish	Common Carp
	Pumpkinseed
	Bluegill
	Bigmouth Buffalo

## PHYSICAL DATA

**Surface Area:** 207 acres

**Maximum depth:** 24 feet

**Volume:** 1,785 acre-feet

**Contour map available:** Yes

**OHWM elevation:** 1559.5

**Outlet elevation:** 1559.0

**Lake elevation observed during the survey:** Full

**Beneficial use classifications:** (5) warmwater semi-permanent fish life propagation, (7) immersion recreation, (8) limited-contact recreation and (9) wildlife propagation and stock watering.

**Watershed area:** 1,118 acres

**Mean depth:** 11.5 feet

**Shoreline length:** 2.5 miles

**Date mapped:** 1994

**Date set:** April, 1983

**Date set:** April, 1983

### **Ownership of Lake and Adjacent Lakeshore Properties:**

Wall Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. The entire shoreline is privately owned with the exception of the Wall Lake Access Area on the southwest corner of the lake and a public swimming beach managed by Minnehaha County on the south shore.

### **Fishing Access:**

The Wall Lake Access Area has a double lane boat ramp, dock, public toilet and excellent shore fishing access. A handicapped-accessible fishing dock was recently installed.

### **Field Observations of Water Quality and Aquatic Vegetation:**

Although dense algae blooms reduced water clarity in some areas of the lake, the Secchi depth measurement was 61 cm (24 in) where measured. A few stands of common cattail (*Typha spp.*) were found around the shoreline in several areas.

### **Summer Fish Kill 2010**

One month after the 2010 lake survey, dead and distressed fish were observed following a heavy rain event. Subsequent investigation found extremely low oxygen levels throughout the lake. Over the next few days, thousands of dead fish were cleaned up by GF&P personnel and lake residents. A post-kill netting survey found that walleye abundance had been reduced while crappie, bluegill, and channel catfish were still abundant. Large walleye fingerlings (3,445) were stocked in the fall to replace the fish lost.

## **BIOLOGICAL DATA**

### **Methods:**

Wall Lake was sampled on June 21-23, 2010 with three overnight gill net sets and ten overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh ( $\frac{3}{4}$  in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , and 2 in) monofilament netting. Sampling locations are displayed in Figure 5.

## Results and Discussion:

### Gill Net Catch

Channel catfish (37.9%), black crappie (19.4%), yellow perch (12.0%), and seven additional species were sampled in the gill nets this year (Table 1). Only five of the 117 channel catfish were longer than 28 cm (11 in) (Table 2).

**Table 1.** Total catch from three overnight gill net sets at Wall Lake, Minnehaha County, June 21-23, 2010.

Species	Number	Percent	CPUE <sup>1</sup>	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Channel Catfish	117	37.9	39.0	+16.2	7.0	--	--	--
Black Crappie	60	19.4	20.0	+6.3	16.0	0	0	93
Yellow Perch	37	12.0	12.3	+2.8	30.9	0	0	91
Walleye	28	9.1	9.3	+3.7	13.9	43	39	82
Black Bullhead	24	7.8	8.0	+0.7	66.4	71	0	88
Common Carp	16	5.2	5.3	+3.1	0.8	19	6	90
Northern Pike	12	3.9	4.0	+1.5	0.5	82	0	81
Bluegill	7	2.3	2.3	+1.1	1.4	--	--	--
Pumpkinseed	5	1.6	1.7	+0.9	2.8	--	--	--
White Sucker	3	1.0	1.0	+0.7	3.3	--	--	--

\* 5 years (2000, 2002, 2004, 2006, 2008)

**Table 2.** Catch per unit effort by length category for various fish species captured with gill nets in Wall Lake June 21-23, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Channel Catfish	37.3	1.7	1.0	0.7	--	39.0	+16.2
Black Crappie	--	20.0	20.0	--	--	20.0	+6.3
Yellow Perch	--	12.3	12.3	--	--	12.3	+2.8
Walleye	1.7	7.7	4.3	0.3	3.0	9.3	+3.7
Black Bullhead	--	8.0	2.3	5.7	--	8.0	+0.7
Common Carp	--	5.3	4.3	0.7	0.3	5.3	+3.1
Northern Pike	0.3	3.7	0.7	3.0	--	4.0	+1.5
Bluegill	--	2.3	2.3	--	--	2.3	+1.1
Pumpkinseed	--	1.7	1.3	0.3	--	1.7	+0.9
White Sucker	--	1.0	--	--	1.0	1.0	+0.7

Length categories can be found in Appendix A.

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

## **Trap Net Catch**

Bluegills (52.9%) and black crappies (26.7%) were the most abundant species sampled in the trap nets (Table 3) along with 13 other species.

**Table 3.** Total catch from nine overnight trap net sets at Wall Lake, Minnehaha County, June 21-23, 2010.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Bluegill	934	52.9	93.4	+62.9	13.3	12	0	100
Black Crappie	472	26.7	47.2	+14.0	37.1	1	0	91
Black Bullhead	204	11.5	20.4	+9.2	119.4	97	12	88
Pumpkinseed	50	2.8	5.0	+2.7	11.1	8	0	91
Bigmouth Buffalo	41	2.3	4.1	+4.1	1.0	100	10	81
Channel Catfish	28	1.6	2.8	+2.0	1.5	--	--	--
Yellow Perch	13	0.7	1.3	+0.8	3.9	0	0	81
Hybrid Sunfish	9	0.5	0.9	+0.5	1.2	--	--	--
Walleye	6	0.3	0.6	+0.3	0.2	--	--	--
Common Carp	3	0.2	0.3	+0.3	7.1	--	--	--
Green Sunfish	2	0.1	0.2	+0.3	0.3	--	--	--
White Sucker	2	0.1	0.2	+0.2	0.3	--	--	--
Yellow Bullhead	1	0.1	0.1	+0.1	0.8	--	--	--
Largemouth Bass	1	0.1	0.1	+0.1	0.0	--	--	--
Northern Pike	1	0.1	0.1	+0.1	0.1	--	--	--

\* 5 years (2000, 2002, 2004, 2006, 2008)

**Table 4.** Catch per unit effort by length category for various fish species captured with trap nets in Wall Lake June 21-23, 2010.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Bluegill	--	93.4	82.5	10.9	--	93.4	+62.9
Black Crappie	--	47.2	46.8	0.4	--	47.2	+14.0
Black Bullhead	--	20.4	0.6	17.3	2.5	20.4	+9.2
Pumpkinseed	--	5.0	4.6	0.4	--	5.0	+2.7
Bigmouth Buffalo	--	4.1	--	3.7	0.4	4.1	+4.1
Channel Catfish	1.8	1.0	0.9	0.1	--	2.8	+2.0
Yellow Perch	--	1.3	1.3	--	--	1.3	+0.8
Hybrid Sunfish*	--	--	--	--	--	0.9	+0.5
Walleye	0.1	0.5	0.2	--	0.3	0.6	+0.3
Common Carp	--	0.3	0.1	0.1	0.1	0.3	+0.3
Green Sunfish	--	0.2	0.1	--	0.1	0.2	+0.3
White Sucker	--	0.2	--	--	0.2	0.2	+0.2
Yellow Bullhead	--	0.1	--	0.1	--	0.1	+0.1
Largemouth Bass	--	0.1	--	--	0.1	0.1	+0.1
Northern Pike	--	0.1	--	--	0.1	0.1	+0.1

\*No length categories established. Length categories can be found in Appendix A.

## **Walleye**

**Management objective:** Maintain a walleye population with a gill-net CPUE of at least 15 and a PSD range of 30-60.

Walleye gill-net CPUE declined slightly and is now similar to CPUE recorded in 2002 and 2004 (Table 5). The sampled fish ranged in length from 200 to 650 mm (7.9 – 25.6 in) (Figure 1). Walleye abundance was further reduced by the summer fish kill so a stocking of large fingerlings was accomplished later in the fall.

**Table 5.** Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPUE	6.7		7.0		33.5		10.3		9.3
PSD	65		0		61		97		43
RSD-P	16		0		2		13		39
Mean Wr	94		83		93		99		82

## **Black Crappie**

**Management objective:** Stock adult black crappies as needed to maintain a fishery.

Black crappie trap-net CPUE varies widely between surveys (Table 6). The length frequency graph shows one strong year class in the population (Figure 2) most likely produced in 2009. Although many black crappies died during the summer fish kill, trap-net CPUE following the kill changed little.

**Table 6.** Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPUE	1.1		4.9		133.7		14.7		47.2
PSD	--		8		13		94		1
RSD-P	--		0		0		1		0
Mean Wr	--		109		125		108		91

## **Yellow Perch**

**Management objective:** Stock adult yellow perch as needed to maintain a fishery.

Yellow perch gill-net CPUE increased in 2010, but remains below average (Table 7). There is evidence of some natural reproduction as all of the fish sampled this year appear to be one year old.

**Table 7.** Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPUE	31.0		47.5		23.5		4.3		12.3
PSD	27		88		79		31		0
RSD-P	1		9		49		8		0
Mean Wr	105		101		89		91		91

## **Black Bullhead**

**Management objective:** Maintain a black bullhead population with a trap-net CPUE of no more than 100.

Black bullhead abundance in Wall Lake has been meeting our management objective since 2006 (Table 8 and Figure 4). The lack of smaller fish in the sample and the lowest ever CPUE suggests poor natural recruitment. It's interesting to note that poor bullhead recruitment coincides with the stocking of hundreds of adult catfish in 2005 and 2006.

**Table 8.** Black bullhead trap-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPUE	147.8		182.2		45.4		49.7		20.4
PSD	83		99		99		97		97
RSD-P	9		6		27		61		12
Mean Wr	100		101		98		91		88

## **All Species**

CPUE for common carp, bigmouth buffalo, channel catfish, northern pike, bluegill and channel catfish was high in 2010 (Table 9). Wall Lake has the most diverse fish community in Region III with seventeen species represented in surveys done over the past 10 years.

**Table 9.** Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Wall Lake, Minnehaha County, 2002-2010.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010
COC (GN)	--		--		2.5		1.3		5.3
COC (TN)	--		--		34.1		0.5		0.3
WHS (GN)	5.7		2.0		0.5		2.7		1.0
WHS (TN)	0.1		0.2		0.3		0.4		0.2
BIB (GN)	--		--		2.0		--		--
BIB (TN)	0.2		0.4		3.6		0.8		4.1
BLB (GN)	89.0		98.5		15.0		13.7		8.0
BLB (TN)	147.8		182.2		45.4		49.7		20.4
YEB (GN)	--		--		--		--		--
YEB (TN)	--		--		0.1		2.3		0.1
CCF (GN)	8.0		4.0		12.0		7.0		39.0
CCF (TN)	5.1		0.4		1.6		0.2		2.8
NOP (GN)	--		1.0		--		0.7		4.0
NOP (TN)	0.3		0.1		--		--		0.1
GSF (GN)	--		--		--		--		--
GSF (TN)	0.7		0.1		0.6		--		0.2
OSF (GN)	--		--		6.0		0.7		--
OSF (TN)	--		--		0.1		0.2		--
HYB (GN)	--		--		--		--		--
HYB (TN)	1.6		--		--		1.6		0.9
PKS (GN)	--		1.5		8.0		4.0		1.7
PKS (TN)	--		1.3		36.6		17.7		5.0
BLG (GN)	--		--		6.0		1.0		2.3
BLG (TN)	0.3		0.5		52.1		13.3		93.4
LMB (GN)	--		--		1.0		--		--
LMB (TN)	--		--		--		--		0.1
WHC (GN)	--		--		--		--		--
WHC (TN)	0.1		--		--		--		--
BLC (GN)	--		1.0		68.0		7.7		20.0
BLC (TN)	1.1		4.9		133.7		14.7		47.2
YEP (GN)	31.0		47.5		23.5		4.3		12.3
YEP (TN)	10.2		1.1		5.9		1.1		1.3
WAE (GN)	6.7		7.0		33.5		10.3		9.3
WAE (TN)	0.3		0.3		0.3		--		0.6

COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), YEB (Yellow Bullhead), CCF (Channel Catfish), NOP (Northern Pike), GSF (Green Sunfish), HYB (Hybrid Sunfish), PSF (Pumpkinseed Sunfish), OSF (Orange-spotted Sunfish), BLG (Bluegill), LMB (Largemouth Bass), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye).

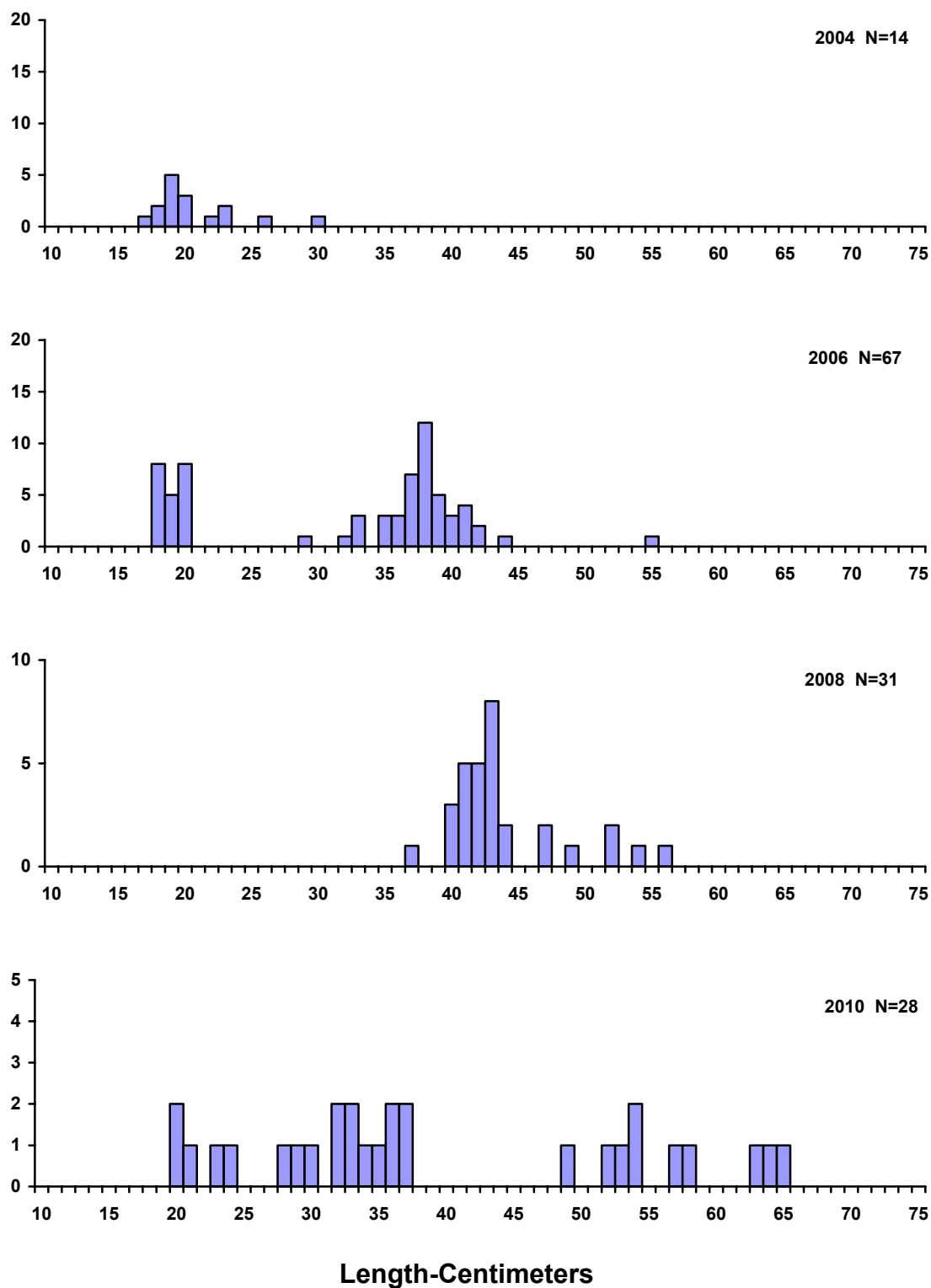
## **MANAGEMENT RECOMMENDATIONS**

1. Stock small walleye fingerlings every other year to maintain the walleye population.
2. Monitor the Wall Lake fishery with biennial netting surveys.

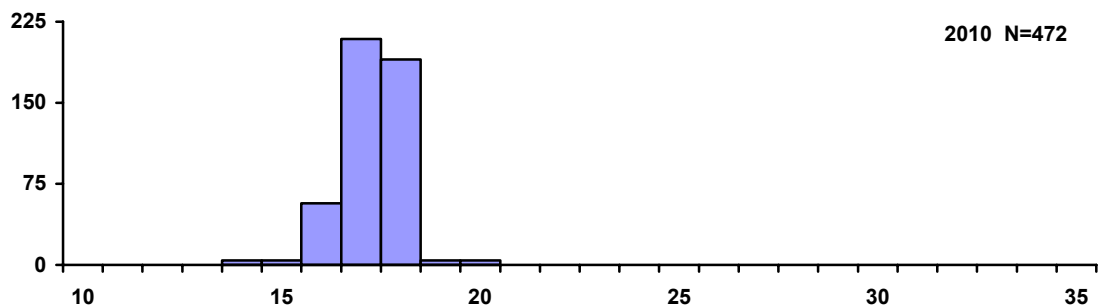
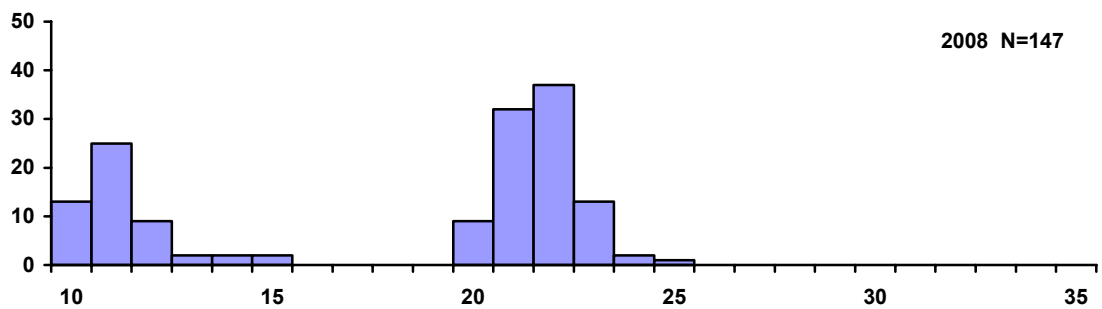
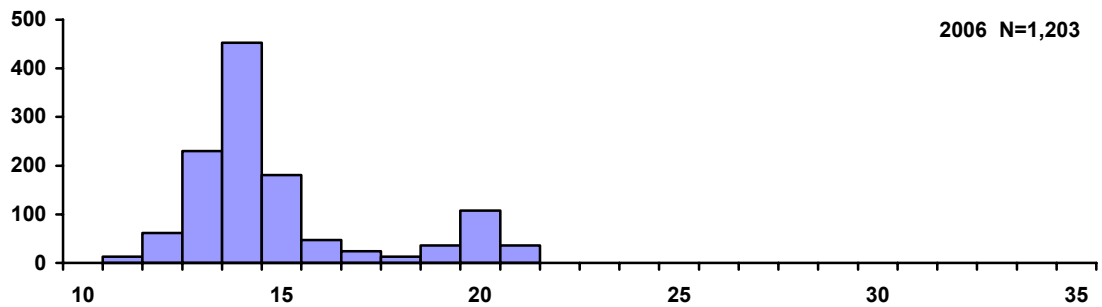
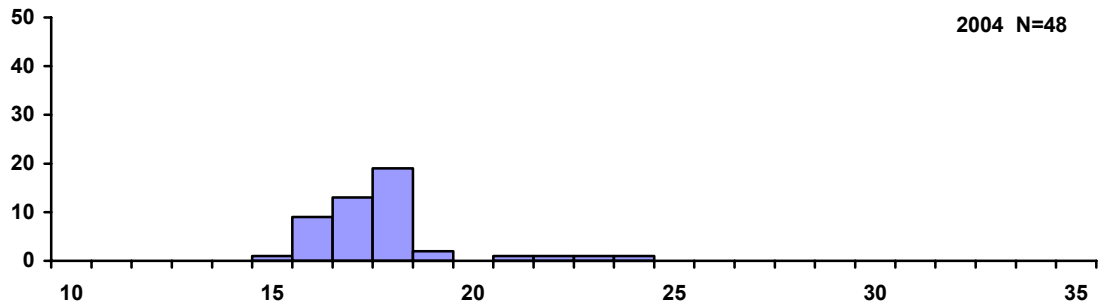
**Table 10.** Stocking record for Wall Lake, Minnehaha County, 1996-2010.

<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1996	2,069	Black Crappie	Adult
	5,000	Walleye	Sml. Fingerling
	14,580	Yellow Perch	Fingerling
1997	2,220	Black Crappie	Adult
1999	20,700	Walleye	Fingerling
	2,100	Yellow Perch	Adult
	2,093	Yellow Perch	Juvenile
2000	545	Black Crappie	Adult
	24	Channel Catfish	Adult
	23	Walleye	Adult
	3,482	Yellow Perch	Adult
2001	1,659	Black Crappie	Adult
	21,120	Walleye	Fingerling
	2,245	Yellow Perch	Adult
2002	9,230	Yellow Perch	Adult
2003	22,414	Walleye	Fingerling
2004	667	Yellow Perch	Adult
	4,827	Black Crappie	Adult
	383	Walleye	Adult
2005	359	Channel Catfish	Adult
	1,034	Yellow Perch	Adult
	7,680	Walleye	Fingerling
2006	3,568	Black Crappie	Adult
	400	Channel Catfish	Adult
	26	Bluegill	Adult
2008	2,472	Walleye	Fingerling
2010	20,340	Walleye	Sml. Fingerling
	3,445	Walleye	Lrg. Fingerling



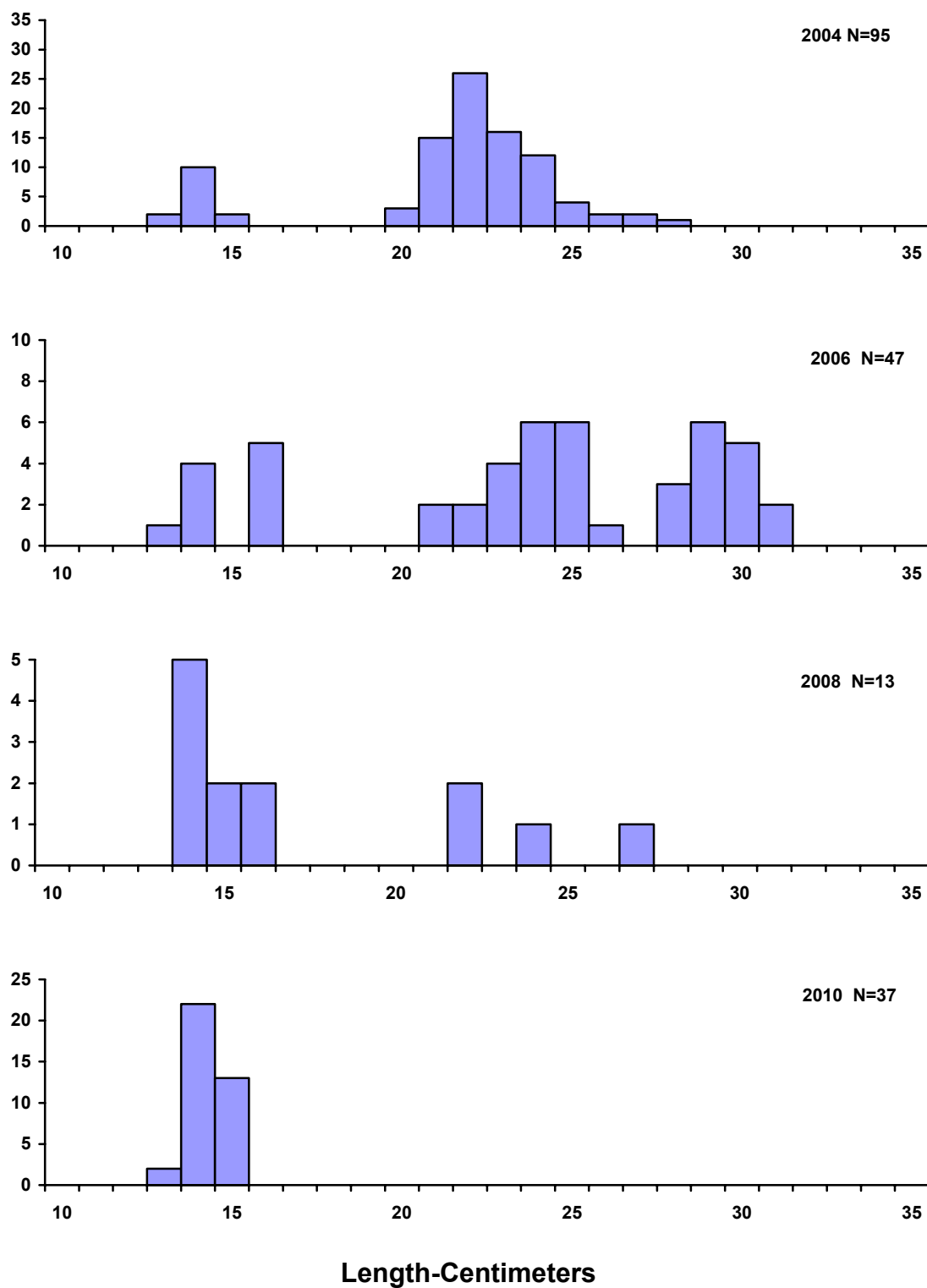


**Figure 1.** Length frequency histograms for walleye sampled with gill nets in Wall Lake, Minnehaha County, 2004, 2006, 2008, and 2010.

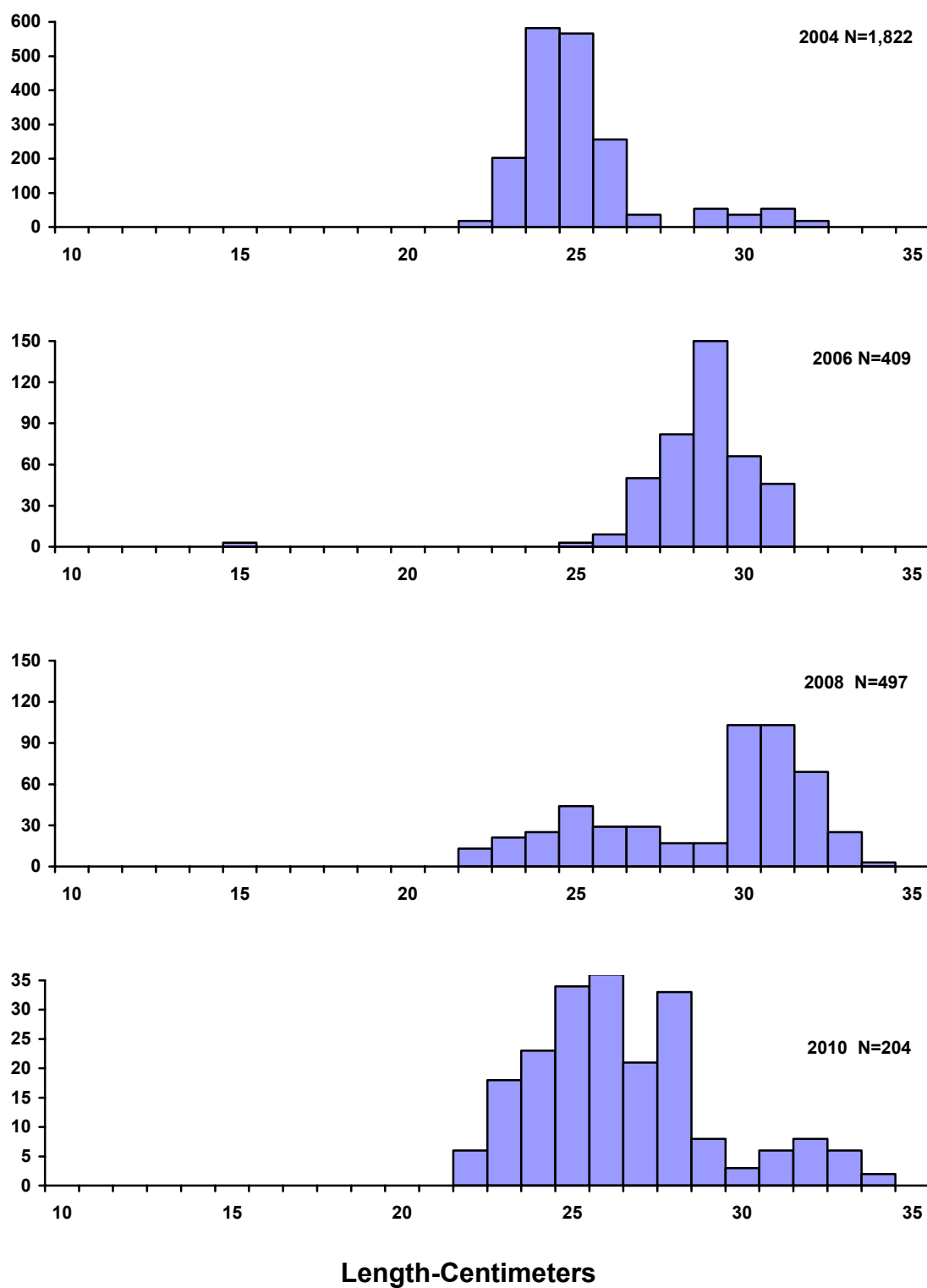


### Length-Centimeters

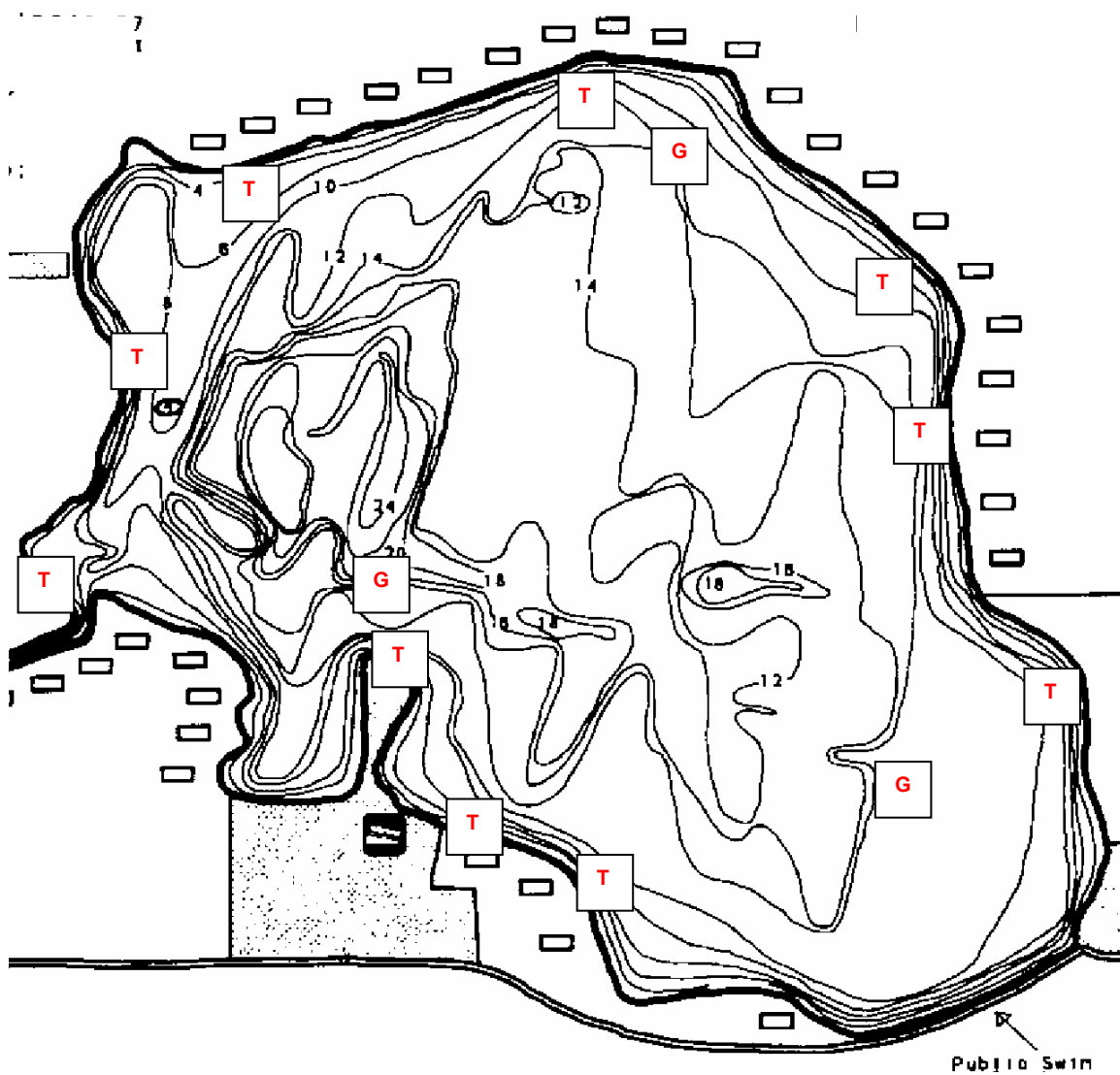
**Figure 2.** Length frequency histograms for black crappies sampled with trap nets in Wall Lake, Minnehaha County, 2004, 2006, 2008, and 2010.



**Figure 3.** Length frequency histograms for yellow perch sampled with gill nets in Wall Lake, Minnehaha County, 2004, 2006, 2008, and 2010.



**Figure 4.** Length frequency histograms for black bullhead sampled with trap nets in Wall Lake, Minnehaha County, 2004, 2006, 2008, and 2010.



**Legend**  
Gill Nets: G  
Trap Nets: T

**Figure 5.** Sampling locations on Wall Lake, Minnehaha County, 2010.

**Appendix A.** A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

**Catch Per Unit Effort (CPUE)** is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

**Proportional Stock Density (PSD)** is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

**Relative Stock Density (RSD-P)** is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (inches in parenthesis).

<b>Species</b>	<b>Stock</b>	<b>Quality</b>	<b>Preferred</b>	<b>Memorable</b>	<b>Trophy</b>
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

**Relative weight (Wr)** is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.